

## In Situ Site Stabilization: The William Salthouse Case Study

**Mark Staniforth**

Department of Archaeology  
Flinders University  
Australia

### Introduction

The wooden sailing vessel *William Salthouse* was wrecked at Port Phillip Heads on Saturday 27 November 1841 at the end of a trading voyage from Canada to the new Port Phillip colony (Victoria) in Australia (Staniforth 2003). The remains of the vessel were relocated in ten to thirteen metres of water by two SCUBA divers during a drift dive in August 1982. As far as can be determined, this was the first time that divers had visited the wreck site, since what was probably limited salvage work ceased in about 1842 (Staniforth & Vickery 1984:4-5).

It is believed that the site had reached a state of relative equilibrium with its environment over the 140 years since wrecking, and only a very small part of the remaining wooden hull structure and organic cargo material protruded above the seabed. The vast majority of the material remains, including the wooden hull structure and wooden-hooped casks, lay buried within a large sand ridge (or sand wave) approximately three metres high (Staniforth 1987).

### Environmental Conditions

The wreck site is located on a sandy seabed covered with highly mobile large and small sand waves. These sand waves result from extremely strong tidal currents (up to six knots) caused by the physical configuration of Port Phillip Bay, a large bay with a relatively narrow opening. The area is now too deep for seagrass to grow, but early charts suggest that during earlier times the water was shallower and the seabed probably had a covering of seagrass. Exactly when, or how quickly, the changes to the seabed flora and topography occurred are impossible to establish with any certainty. Nevertheless, they are considered likely to have resulted from human-influenced changes in the environmental conditions caused by factors such as nearby channel dredging, the scallop fishery and changes to water quality within Port Phillip Bay, most of which occurred in the 20th-century.

### Diver Disturbance

Generally, diving on the site is only possible at slack water — a period lasting from a few minutes to over an hour at the change of tide. The finding of the wreck of the *William Salthouse* very quickly became common knowledge among the diving community in Victoria and the surface of the site was extensively disturbed by souvenir hunters over a period of a few weeks in late 1982. The site was inspected several times by maritime archaeologists from the Maritime Archaeology Unit of the Victoria Archaeological Survey

(VAS) in December 1982 and on one occasion as many as twelve dive boats and 60 divers were observed on the site.

The site was declared as an historic shipwreck under the provision of the Historic Shipwrecks Act 1981 (Victoria), but looting continued over the summers of 1982 and 1983, and on 9 February 1983 the site was declared as a 250-metre radius protected zone (Harvey 1996:1-2). Protected zone status meant that no diving was allowed within the protected zone, and an effective enforcement program was put in place using water police and inspectors appointed under the Historic Shipwrecks Act 1981. Further inspections during March 1983 indicated that declaration as a protected zone had largely put a stop to the site disturbance, but surface damage was already clearly extensive.

### Test Excavation

In order to establish the extent of the damage to the site and to evaluate the amount of hull structure and cargo material remaining, it was decided to conduct an emergency test excavation during May 1983. The main aim of the test excavation program was to produce a detailed site plan to aid in future management of the site, and a secondary aim was to conduct research into the stowage methods used aboard the vessel. The wreck site is approximately 25 metres long and 8 metres wide. Two trenches (each 2 metres wide and 8 metres long) were excavated across the site using airlifts - one forward and one aft of the main mast (Staniforth & Vickery 1984:5-11). This represented less than 20% of the surface area of the site, and excavation ceased when complete and undisturbed cask or other cargo material was encountered. The test excavation showed that while disturbance on the site was extensive, this was restricted to the surface levels (0 to 0.3 metres), and below these levels most of the cargo material was undisturbed.

### Site-Monitoring and Public Access

After the test excavation program was completed, the *William Salthouse* site remained a protected zone and was therefore closed to public access and diving. A site-monitoring program conducted by Maritime Archaeology Unit staff was commenced, and in October 1983 increased scouring was noted on the site. Further inspection of the site in 1984 indicated that scouring appeared to have been reduced, and that the stern section of the wreck was then completely covered by sand (Harvey 1996).

As a result of media coverage, public interest was high, and divers wanted to be allowed to dive on the site. In order to allow at least some public access, a permit system was started in March 1984 which allowed a limited number of divers (twelve) to visit the site at strictly controlled times. The permit system was subsequently extensively used by dive charter operators who were warned that evidence of site



**Figure 1: Moving sea grass matting into position (M. Staniforth)**



**Figure 2: Build up of stabilised sand following placement of artificial sea grass matting**



**Figure 3: Close-up of accumulated sand and artificial sea grass fronds**

disturbance could result in the confiscation of their boat for up to 60 days. As a result dive charter operators strongly pushed the “non-disturbance” provisions of the legislation to their divers. Despite this, on-going monitoring of the site showed that accidental damage was occurring. Some was caused by poor buoyancy control among newly qualified divers and some surface disturbance was continuing as a result of hand-fanning by divers (Harvey 1996). Monitoring also showed that sand was steadily moving off the site and sections of the hull and cargo were becoming more exposed.

### Early Site Stabilization Attempts

In 1985 the first attempt was made to reduce scour and increase sediment build-up over the site by positioning five small fences (0.4m high and 1.5m long) made of iron reinforcing rod at right angles to the tidal current. These fences caught mobile kelp and algae that rolled across the seabed, which then resulted in sediment buildup in some places, but increased scour in others. This experiment was followed by several other unsuccessful attempts to increase the sand cover over the site including using a water dredge to pump sand onto parts of the site and bulk dumping of several hundred tons of sand onto the site from the dredge Matthew Flinders. Finally in 1987 the site was closed to diving again and a temporary solution using hessian sandbags to support undermined sections of the hull was put in place (Hosty 1988). By 1989, however, the hessian sandbags were beginning to break down and a more permanent solution was sought.

### Artificial Sea Grass Matting

Artificial sea grass matting made from closed-cell foamed polypropylene (Cegrass Erosion Control System) was purchased from Cebo UK Ltd based in Aberdeen, Scotland. Twenty-four strips (each 1.6 cm wide by either 90 cm, 120 cm or 150 cm long) were attached to a plastic clip and then to an iron reinforcing rod mesh (6m by 2.4 m with a 0.2m square mesh size) to create an artificial sea grass mat. The mats were weighted with 30 cm lengths of railway iron and a

total of 42 mats were deployed around (but not over) the site of the *William Salthouse* in 1990.

Sediment deposition around the wrecksite increased immediately. Even over the site where no sea grass matting had been placed, sand began to build up. Minor adjustments to the placement of sea grass mats to eliminate the remaining problems with scouring and a regular monitoring program took place over the next three years to ensure the stability of the site. Public access via the permit system was reinstated in 1993.

### Conclusion

Artificial sea grass proved to be an effective method of site stabilization on the wrecksite of the *William Salthouse*. The overall cost of the project was approximately A\$100,000 making it a cost-effective option for site stabilization for wooden wrecks threatened by loss of sediment cover as a result of environmental change exacerbated by human influences.

### Information Sources

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